What would we be able to do if we could build electronically integrated machines the size of a single cell? At a scale of 50 microns, or about half a hair’s diameter, semiconductor devices are small enough that we could put the computational power of the spaceship Voyager onto a machine that could be injected into the body. Such robots could have on board detectors, power sources, and processors that enable them to sense, interact, and control their local environment. In this talk I will describe several cutting edge technologies we are developing to achieve this vision.

Professor Itai Cohen studies the physics of matter in motion. At Cornell, his research has focused on building robots the size of cells, controlling the shear thickening behavior of microscopic and nanoscopic particles suspended in a fluid, exploring the mechanics of materials ranging from biological tissues to origami inspired metamaterials, discovering the aerodynamic and neuromuscular mechanisms used by insects during flapping flight, and determining how Tango dancers and audiences at heavy metal concerts coordinate their movement. Understanding how emergent behaviors arise from the microscopic rules governing these systems remains one of the biggest challenges in Physics.